

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P 03/005-DeNK</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/EP 03/14537</b>	International filing date (day/month/year) <b>18/12/2003</b>	(Earliest) Priority Date (day/month/year) <b>24/01/2003</b>
Applicant <b>MERCK PATENT GMBH</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 7 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

P 03/14537

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C09K19/04 C09K19/34 C09K19/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C09K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 116 769 A (FUJI PHOTO FILM CO LTD) 18 July 2001 (2001-07-18) cited in the application	1-7, 9-12, 14, 17, 18
Y	page 7, paragraph 17	16
A	page 10, paragraph 39 -page 13, line 28	8, 13, 15
	claims; examples	
Y	WO 92/16519 A (SECR DEFENCE BRIT) 1 October 1992 (1992-10-01) page 4, paragraph 2 -page 5, paragraph 3; claims	16
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

Date of the actual completion of the international search

4 May 2004

Date of mailing of the international search report

21/05/2004

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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 033 731 A (FUJI PHOTO FILM CO LTD) 6 September 2000 (2000-09-06) cited in the application page 22, paragraph 59 page 26, paragraph 82 -page 40, paragraph 87 claims; examples ---	1-7, 9-11, 14, 17, 18
X	YUICHIRO HARAMOTO ET AL.: "NEW PYRIDINIUM TYPE IONIC LIQUID CRYSTAL COMPOUNDS WITH A 1,3- DIOXANE RING IN THE PRINCIPAL STRUCTURE" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 21, no. 6, 1 December 1996 (1996-12-01), pages 923-925, XP000639781 ISSN: 0267-8292 the whole document ---	1-3
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 06, 30 April 1998 (1998-04-30) -& JP 10 053585 A (NIPPON CHEM IND CO LTD; HARAMOTO YUICHIRO), 24 February 1998 (1998-02-24) abstract ---	1-3, 14
X	US 5 098 975 A (OMELIS JURGEN ET AL) 24 March 1992 (1992-03-24) column 9, line 64 -column 10, line 2; claim 1 ---	1, 12-15
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10, 31 October 1996 (1996-10-31) -& JP 08 157456 A (DAINIPPON PRINTING CO LTD), 18 June 1996 (1996-06-18) abstract ---	1, 14
X	WO 87/02693 A (UNIV SHEFFIELD) 7 May 1987 (1987-05-07) claims ---	1
X	CUI L ET AL: "SYNTHESIS AND THERMAL BEHAVIOUR OF LIQUID CRYSTALLINE PYRIDINIUM BROMIDES CONTAINING A BIPHENYL CORE" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 29, no. 9, September 2002 (2002-09), pages 1121-1132, XP001116892 ISSN: 0267-8292 the whole document ---	1
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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE INSPEC 'Online!  INSTITUTE OF ELECTRICAL ENGINEERS,  STEVENAGE, GB;  HARAMOTO Y ET AL: "Liquid crystal  properties of new ionic liquid crystal  compounds having a 1,3-dioxane ring"  Database accession no. 7266074  XP002277948  abstract  &amp; LIQUID CRYSTALS, JAN. 2002, TAYLOR &amp;  FRANCIS, UK,  vol. 29, no. 1, pages 87-90,  ISSN: 0267-8292</p>	1
X	<p>DATABASE INSPEC 'Online!  INSTITUTE OF ELECTRICAL ENGINEERS,  STEVENAGE, GB;  KIJIMA M ET AL: "Synthesis of novel ionic  liquid crystalline pyrrole derivatives  having a viologen moiety"  Database accession no. 7123102  XP002277949  abstract  &amp; 18TH INTERNATIONAL LIQUID CRYSTAL  CONFERENCE, SENDAI, JAPAN, 24-28 JULY  2000,  vol. 364, pages 911-918,  Molecular Crystals and Liquid Crystals,  2001, Gordon &amp; Breach, Switzerland  ISSN: 1058-725X</p>	1
X	<p>UJIE S ET AL: "THERMAL AND LIQUID  CRYSTALLINE PROPERTIES OF LIQUID  CRYSTALLINE POLYMETHACRYLATES WITH  AMMONIUM UNITS AND THEIR NON-IONIC FAMILY"  POLYMERS FOR ADVANCED TECHNOLOGIES, JOHN  WILEY AND SONS, CHICHESTER, GB,  vol. 11, no. 8-12, August 2000 (2000-08),  pages 450-455, XP000977317  ISSN: 1042-7147  the whole document</p>	1
X	<p>DATABASE INSPEC 'Online!  INSTITUTE OF ELECTRICAL ENGINEERS,  STEVENAGE, GB;  HARAMOTO Y ET AL: "New 1,3-dioxane type  ionic liquid crystal compounds having a  different counter anion"  Database accession no. 6779505  XP002277950  abstract  &amp; MOLECULAR CRYSTALS AND LIQUID CRYSTALS,  2000, GORDON &amp; BREACH, SWITZERLAND,  vol. 348, pages 129-136,  ISSN: 1058-725X</p>	1

## INTERNATIONAL SEARCH REPORT

International Application No

EP 03/14537

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	VEBER M ET AL: "IONIC LIQUID CRYSTALS: SYNTHESIS AND MESOMORPHIC PROPERTIES OF DIMERIC 2,4,6-TRIARYLPYRYLIUM TETRAFLUOROBORATES" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 27, no. 5, May 2000 (2000-05), pages 671-676, XP000932282 ISSN: 0267-8292 the whole document ---	1
X	HARAMOTO Y ET AL: "NEW IONIC LIQUID CRYSTAL COMPOUNDS HAVING A 1,3-DITHIANE OR 1,3-DIOXANE RING" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 26, no. 10, October 1999 (1999-10), pages 1425-1428, XP000887946 ISSN: 0267-8292 the whole document ---	1
X	HARAMOTO Y ET AL: "NEW 1,3-DITHIANE TYPE IONIC LIQUID CRYSTAL COMPOUNDS" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 24, no. 6, 1 June 1998 (1998-06-01), pages 877-880, XP000773009 ISSN: 0267-8292 the whole document ---	1
X	ARTZNER F ET AL: "EVIDENCE OF NEMATIC, HEXAGONAL AND RECTANGULAR COMUMNAR PHASES IN THERMOTROPIC IONIC LIQUID CRYSTALS" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 23, no. 1, 1 July 1997 (1997-07-01), pages 27-33, XP000701478 ISSN: 0267-8292 the whole document ---	1
X	HARAMOTO Y ET AL: "A NEW IONIC LIQUID CRYSTAL COMPOUNDS WITH VIOLOGEN GROUP IN THE PRINCIPAL STRUCTURE" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 19, no. 3, 1 September 1995 (1995-09-01), pages 319-320, XP000536247 ISSN: 0267-8292 the whole document ---	1
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	<p>DATABASE INSPEC 'Online! INSTITUTE OF ELECTRICAL ENGINEERS, STEVENAGE, GB; HARISTOY D ET AL: "Novel ionic liquid-crystalline compounds bearing oxadiazole and pyridinium moieties as prospective materials for optoelectronic applications" Database accession no. 7702539 XP002277947 abstract &amp; CHEMISTRY OF MATERIALS, 20 MAY 2003, AMERICAN CHEM. SOC, USA, vol. 15, no. 10, pages 2079-2083, ISSN: 0897-4756</p> <p>-----</p>	1

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1116769	A	18-07-2001	JP 2001202995 A	27-07-2001
			EP 1116769 A2	18-07-2001
			US 2002034690 A1	21-03-2002
WO 9216519	A	01-10-1992	CA 2082800 A1	14-09-1992
			DE 69232583 D1	06-06-2002
			DE 69232583 T2	24-10-2002
			EP 0530338 A1	10-03-1993
			WO 9216519 A2	01-10-1992
			JP 5507725 T	04-11-1993
			KR 249071 B1	01-04-2000
			KR 254720 B1	15-04-2000
			US 5888421 A	30-03-1999
EP 1033731	A	06-09-2000	EP 1033731 A2	06-09-2000
			JP 2000319260 A	21-11-2000
			US 6495067 B1	17-12-2002
JP 10053585	A	24-02-1998	NONE	
US 5098975	A	24-03-1992	DE 3924554 A1	31-01-1991
			EP 0410205 A2	30-01-1991
			JP 3170597 A	24-07-1991
JP 08157456	A	18-06-1996	NONE	
WO 8702693	A	07-05-1987	EP 0252925 A1	20-01-1988
			WO 8702693 A1	07-05-1987